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42. The structure of claim 39 further comprising a second substantially dopant-free, uninterrupted diffusion barrier layer over said substrate second surface.

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43. The structure of claim 39, wherein said substantially dopant-free, uninterrupted diffusion barrier layer comprises one of the group consisting of silicon nitride and silicon oxynitride.

44. The structure of claim 39, wherein said at least one first doped area comprises a p-type impurity and said at least one second, differently doped area comprises an n-type impurity.

45. The structure of claim 39, wherein said at least one first doped area comprises an n-type impurity and said at least one second, differently doped area comprises a p-type impurity.

REMARKS

Applicants note the filing of an Information Disclosure Statement herein on June 11, 1999 and note that the copy of the PTO-1449 was not returned with the outstanding Office Action. Applicants respectfully request that the information cited on the PTO-1449 (which is the same as that of record to that date in the parent application hereto) be made of record herein and an initialed copy of the PTO-1449 be returned to applicants' undersigned attorney evidencing the same.

The Office Action mailed November 5, 1999, has been received and reviewed. Claims 25 through 32 are currently pending in the application. Claims 25 through 32 stand rejected. Applicants have amended claim 25 and added new claims 33 through 45, and applicants respectfully request reconsideration of the application as amended herein.

35 U.S.C. § 102(e) Anticipation Rejections

Anticipation Rejection Based on Applicants' Admitted Prior Art -

Claims 25, 26 and 29 through 31 stand rejected under 35 U.S.C. § 102(e) (hereinafter "Section 102(e)") as being anticipated by prior art disclosed in the instant application. However, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in the allegedly anticipating reference in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants respectfully submit that the prior art cited in the instant application does not anticipate claims 25, 26, 29 and 30. Claims 29 and 30 have been canceled, and, therefore, applicants respectfully submit that the rejection of claims 29 and 30 is no longer relevant and should be withdrawn. Moreover, applicants respectfully submit that the prior art cited in the instant application does not disclose each and every element set forth in the rejected claims, particularly in light of the amendments contained herein. Therefore, the prior art cited in the instant application can not anticipate claim 25, 26, or 31 under Section 102(e).

As it has been amended, claim 25 is an independent claim reciting a "pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device." The intermediate structure of claim 25 includes a substrate with first and second surfaces, at least one p-well and at least one n-well on the first surface, at least one p-type area within said at least one n-well, and at least one n-type area within said at least one p-well. The intermediate structure of claim 25 further includes a substantially dopant-free, uninterrupted diffusion barrier layer over said at least one p-well and said at least one n-well on the first surface of the substrate. Therefore, in order to anticipate claim 25, a reference must explicitly or inherently teach a device having each of the limitations recited in claim 25. *See, Richardson*, 9 USPQ2d 1913 (Fed. Cir. 1989).

Claims 26 and 31 depend from claim 25, and, as a consequence, both of claims 26 and 31 incorporate all of the limitations recited in claim 25. Thus, in order for a reference to anticipate

claims 26 and 31, that reference must at least explicitly or inherently teach a device having all the limitations recited in claim 25, as amended.

Applicants respectfully submit that the prior art described in the instant application does not explicitly or inherently teach each of the limitations recited in claim 25. In contrast to subject matter recited in amended claim 25, the structure taught by the prior art included in the instant application does not include a semiconductor substrate having a first surface and a second surface, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and at least one n-well on the substrate first surface. Therefore, the prior art described in the application does not anticipate claim 25, and applicants respectfully request that the rejection of claim 25 under Section 102(e) be withdrawn.

Additionally, applicants respectfully submit that the prior art discussed in the specification of the instant application does not inherently or explicitly teach each of the limitations recited in claims 26 and 31. Both of claims 26 and 31 incorporate all of the limitations recited in amended claim 25, and because the prior art described in the application does not explicitly or inherently teach all of the limitations recited in amended claim 25, the same could not teach or suggest each of the limitations recited in claims 26 and 31. Therefore, applicants respectfully submit that claims 26 and 31 are not anticipated by the prior art set forth in the specification of the instant application, and applicants respectfully request that the rejection of claims 26 and 31 under Section 102(e) be withdrawn.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Applicants' Admitted Prior Art and in View of U.S. Patent No. 5,837,378 to Mathews et al

Claims 27 and 28 stand rejected under 35 U.S.C. § 103(a) (hereinafter "Section 103(a)") as being unpatentable over the prior art discussed in the instant application and further in view of Mathews et al. (U.S. Patent No. 5,837,378). However, applicants respectfully submit that the

combined teachings of the prior art disclosed in the instant application and Mathews et al. fail to establish at least one of the three criteria essential to establish *prima facie* obviousness.

As is set forth in M.P.E.P § 706.02(j), three essential criteria must be met before a *prima facie* case of obviousness can be properly established.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

In this case, the combined teachings of the prior art disclosed in the instant application and Mathews et al. do not teach or suggest all of the limitations recited in claims 27 and 28. Therefore, applicants respectfully submit that the combination of the prior art disclosed in the instant application and Mathews et al. fails to establish the *prima facie* obviousness of claims 27 and 28.

Claims 27 and 28 depend from amended claim 25. Therefore, claims 27 and 28 incorporate recitations of an intermediate structure including a substrate with first and second surfaces, at least one p-well and at least one n-well on the first surface, at least one p-type area within said at least one n-well, and at least one n-type area within said at least one p-well. The intermediate structure of claims 27 and 28 further includes a substantially dopant-free, uninterrupted diffusion barrier layer over said at least one p-well and said at least one n-well on the first surface of the substrate. Therefore, in order to establish the *prima facie* obviousness of claims 27 and 28, a combination of references must at least teach or suggest each of these recited limitations.

The prior art discussed in the instant patent application does not teach or suggest an intermediate structure as recited in claim 27 or claim 28. The prior art discussed in the application may teach a pre-anneal intermediate structure having first and second surfaces, p-wells and n-wells in the first surface, an oxide layer, and a substantially contaminant-free, uninterrupted nitride layer disposed over the first surface of the intermediate structure. However, the prior art discussed in the instant application does not teach or suggest such a structure also including n-type areas in the p-

wells and p-type areas in the n-wells. Thus, the prior art discussed in the instant application fails to teach or suggest an intermediate structure having all the limitations as those recited in claims 27 and 28.

Significantly, the teachings of Mathews et al. do nothing to remedy the deficiencies of the prior art discussed in the instant application. Mathews et al. teaches a method of reducing stress-induced defects in silicon. During the course of the process taught by Mathews et al., an intermediate structure is created which includes a "masking stack" (an oxide layer and a nitride layer) on both the top and bottom surfaces of a silicon wafer. However, Mathews et al. does not teach or suggest an intermediate structure including a masking stack on both the top and bottom surfaces of a silicon wafer having even one doped area on the top surface. In fact, in order for the method of Mathews et al. to work effectively, the masking stack on the bottom side of the silicon wafer is removed before any further processing occurs (col. 2, lines 15-22, col. 5, lines 31-41, and col. 6, Lines 12-16). Thus, the teachings of Mathews et al. add nothing to the prior art discussed in the instant application that might teach or suggest an intermediate structure as recited in claims 27 or 28.

It is stated in the Office Action that "it would have been obvious to one having ordinary skill in the art . . . to form the barrier layer 154b over second surface of the substrate (202) of applicant's prior art as taught by Mathews because the formation of the barrier layer on the second surface reduces overall stress on the wafer thus prevent[ing] warpage" (Office Action, page 4). This assertion, however, does not take into account that the intermediate structure of the prior art discussed in the instant application does not include a semiconductor substrate having a first surface and a second surface, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and at least one n-well on the substrate first surface. Furthermore, this assertion ignores the fact that Mathews et al. teaches only a method for reducing stress while forming a field oxide pattern on a semiconductor substrate **before** any doping of the semiconductor substrate is performed. Thus, the teachings of Mathews et al. combined with the teachings of the prior art disclosed in the instant

application do not teach or suggest a pre-anneal intermediate structure as recited in claims 27 and 28.

Applicants respectfully request that the rejection of claims 27 and 28 under Section 103(a) be withdrawn. The teachings of the prior art discussed in the instant application combined with the teachings of Mathews et al. simply do not teach or suggest an intermediate structure having all the limitations recited in claims 27 and 28. Applicants respectfully submit that the combined teachings of the cited references do not even teach or suggest all the limitations recited in claim 25, from which both claims 27 and claim 28 depend. Therefore, because a dependent claim can only be obvious if the independent claim from which it depends is obvious, applicants request that the Examiner withdraw the Section 103 rejection of claims 27 and 28. See, *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988); M.P.E.P. § 2143.03.

Obviousness Rejection Based on Applicants' Admitted Prior Art and in view of U.S. Patent No. 5,846,596 to Shim et al.

Claim 32 stands rejected under Section 103(a) as being unpatentable over the prior art discussed in the instant application and further in view of Shim et al. (U.S. Patent No. 5,846,596). However, applicants respectfully submit that the combined teachings of the prior art discussed in the instant application and Shim et al. do not establish the *prima facie* obviousness of claim 32. Thus, applicants respectfully traverse the rejection of claim 32 under Section 103(a) and request that this rejection be withdrawn.

As was already detailed, a *prima facie* case of obviousness can not be properly established unless the combined prior art references teach or suggest all the limitations of the claims rejected. Claim 32 depends from amended claim 25. Consequently, the structure recited in claim 32 includes a semiconductor substrate having a first surface and a second surface, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and at least one n-well on the substrate first surface. The teachings of the prior art disclosed in the instant application combined with the teachings of Shim et al. simply do not teach or suggest an intermediate structure having each of these

limitations. Thus, applicants respectfully submit that the combination of references cited against claim 32 does not support a *prima facie* case of obviousness.

As further detailed herein, the prior art discussed in the instant application does not teach or suggest a pre-anneal intermediate structure having a semiconductor substrate with a first surface and a second surface, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and at least one n-well on the substrate first surface. Moreover, Shim et al. adds nothing to the prior art teachings referenced in the instant application that teaches or suggest an intermediate structure as recited in claim 32.

Shim et al. teaches a method of forming field oxide isolation regions having sloped edges. During the process taught by Shim, oxide layers and non-oxidative nitride layers are formed over the semiconductor substrate surface. However, Shim et al. does not teach an intermediate structure having a semiconductor substrate having a first surface and a second surface, at least one p-well and at least one n-well on the substrate first surface, at least one p-type area within the at least one n-well, at least one n-type area within the at least one p-well, and a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and at least one n-well on the substrate first surface. In fact, Shim et al. teaches only a method of creating a field oxide structure which defines areas on the surface of a semiconductor substrate which are to be **subsequently** doped (col. 3. Lines 26-32). Moreover, Shim et al. is devoid of any teaching or suggestion that would motivate one of ordinary skill in the art to form a diffusion barrier layer over the semiconductor substrate before an annealing step. Thus, the teachings of Shim et al. do nothing to remedy the deficiencies of the prior art referenced in the instant application, and applicants respectfully request that the Section 103(a) rejection of claim 32 based on the prior art referenced in the instant application combined with Shim et al. be withdrawn.

CONCLUSION

Claims 25 through 28 and 30 through 45 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



Samuel E. Webb
Registration Number 44,394
Attorney for Applicants
TRASK, BRITT & ROSSA
P.O. Box 2550
Salt Lake City, Utah 84110
Telephone: (801) 532-1922

SEW/dm

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